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This special section of JPE focuses on the science and technology of organic solar cells. Tremendous progress has been made in the synthesis and production of organic solar cells. Companies like Merck, BASF, Plextronics, etc. have started to commercialize organic semiconducting materials, while companies like BELECTRIC OPV, Heliatek, and others have begun commercialization of organic solar modules.

Compared to inorganic solar cells, organic photovoltaics (OPVs) offer many advantages, such as low cost, high throughput production, flexible devices, and lightweight products, as well as custom-designed colors. On the down side, OPVs still have significantly lower efficiency values and lifetime expectations as compared to their inorganic counterparts. Nevertheless, the most recent NREL certified power conversion of 10.6% reported by UCLA, and the record conversion efficiency of 11.8% reported by Kyung Hee University, position OPVs as the next generation of solar cells and a follow-up technology for thin-film inorganic PVs.

Several things need to take place in order to achieve higher efficiency and better lifetime. For example, stable and low-bandgap semiconductors are required, and they must have excellent charge carrier transport properties, as well as implementation of more advanced approaches such as tandem and ternary solar cells. It is also necessary to find ways to control the microstructure in bulk heterojunction composites. In addition, efficient and environmentally stable interface materials must be developed. Finally, a cost-efficient and long-time stable packaging process needs to be established. For the final product release, light propagation and light management needs to become integrated into organic solar modules.

The papers presented in this special section are a small snapshot of the evolving and ongoing progress in this field, addressing aforementioned issues and challenges.

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